Appendix 1 3D-Slicer in-house protocol (overview)

After the DICOM data were imported in 3D Slicer, four main steps were required to obtain a full segmentation of the pulmonary anatomy, including the bronchial tree, lung lobes, pulmonary vessels, and lung nodule. In the first step, the "Segment Airways" algorithm within the "Chest Imaging Platform" was used for the segmentation of the bronchial tree of the affected lobe, as this algorithm's segmentation method is able to segment until the third (segmental) bronchus generation. Margin growing of 1 mm over the bronchial tree was performed to improve the visibility of more distal branches using the "Margin" segmentation tool.

Second, the "Interactive Lobe Segmentation" tool within the "Chest Imaging Platform" was used to segment the lung lobes based on the location of the lung fissures.

During the third step, the lung nodule was segmented using a semi-automatic extension named "Local Thresholding", and the "Watershed algorithm" to ensure any holes in the lung nodule segmentation were filled. Subsequently, the surgical margin of the lung nodule was segmented by a 2 cm margin growing of the lung nodule segmentation.

In the final step, the pulmonary vasculature was segmented using a fast GrowCut algorithm "Grow from Seeds". Therefore, the heart, pulmonary vein, pulmonary artery, and other structures irrelevant for the 3D lung reconstruction (e.g., as the bony structures, liver, and skin) were labeled using the brush tool in a single axial, sagittal, and coronal plane. The pulmonary veins and arteries required labeling of at least three transversal slices: below, above, and at the level of the bifurcation of the pulmonary artery trunk. To save time, the labeling was focused on the target lobe and adjacent lung lobe.

In addition, in case of inaccuracies upon visual inspection, manual adjustments were performed using the "Paint" tool for adding structures and both the "Cut" tool and "Island" tool for the removal of unwanted structures.

Table S1 System Usability Scale questionnaire

1. I think that I would use this model frequently	1	2	3	4	5
2. I found the model unnecessarily complex	1	2	3	4	5
3. I though the model was easy to use	1	2	3	4	5
4. I think that I would need the support of a technical person to be able to use the system	1	2	3	4	5
5. I found the various functions in the model were well integrated	1	2	3	4	5
6. I think there was too much inconsistency in the mode	1	2	3	4	5
7. I would think most people will learn to use the model very quickly	1	2	3	4	5
8. I found the model very cumbersome to use	1	2	3	4	5
9. I felt very confident using the model	1	2	3	4	5
10. I needed to learn a lot before I could get going with the model	1	2	3	4	5

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Table S2 Intraoperative and postoperative outcomes

Patient	Performed lung resection	Conversion	Surgery duration (min)	EBL (mL)	Difficulty surgery	Resection margin	Pathological TNM8	Tumor size (mm)	Final pathology	Drainage duration (days)	LOHS (days)	Complications
1	Lobectomy RLL + wedge RML	Yes, due to technical reasons	260	600	4	R0	pT2PL1N0M0	30	Adenocarcinoma and squamous cell carcinoma	5	8	Surgical removal empyema with PAL (17 days), wound infection with VAC device
2	Lobectomy RLL	No	75	50	1	R0	pT1cN1M0	21	Adenocarcinoma	1	4	No
3	Lobectomy RUL	No	91	50	4	R0	pT2aN0M0	35	Adenocarcinoma	1	2	No
4	Segmentectomy S2 right	No	153	50	3	R0	pT1bN0M0	16	Adenocarcinoma	1	2	No
5	Lobectomy RLL and lymphatic fluid removal	No	169	30	3	R0	pT3N0PM0	55	Adenocarcinoma	6	10	Urinary tract infection
6	Lobectomy LLL	No	115	30	2	R0	pT1bN0M0	12	Squamous cell carcinoma	2	3	Subcutaneous emphysema
7	Lobectomy RUL	No	97	100	2	R0	pT2aPL1N0M0	22	Adenocarcinoma and squamous cell carcinoma	1	2	No
8	Frozen wedge-resection RUL and completion lobectomy RUL	No	154	200	4	R0	pT2aPL1N0M0	28	Adenocarcinoma	7	7	PAL (>5 days)
9	Completion lobectomy RUL	No	115	50	4	R0	pT1bN0M0	16	Adenocarcinoma	1	2	No
10	Lobectomy LLL	No	144	400	3	R0	pT3N0M0	61	Squamous cell carcinoma	2	3	Subcutaneous emphysema
11	Lobectomy LLL	No	128	50	2	R0	pT3N0M0	60	Squamous cell carcinoma	2	2	No
12	Lobectomy LUL	No	199	200	5	R0	pT4N0M0	120	Squamous cell carcinoma	1	2	No
13	Lobectomy LUL	No	164	50	4	R0	pT3N0M0	70	Adenocarcinoma	1	2	No

EBL, exact blood loss; LLL, left lower lobe; LOHS, length of hospital stay; LUL, left upper lobe; PAL, prolonged air leakage; RLL, right lower lobe; RML, right middle lobe; RUL, right upper lobe; TNM8, Tumor Node Metastasis classification 8th edition; VAC, vacuum-assisted closure device; VATS, video-assisted thoracoscopic surgery.

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